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CLINICAL BRIEF

Neonatal Meningitis and Sepsis by *Chryseobacterium indologenes*: A Rare and Resistant Bacterium

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Abstract Early neonatal meningitis with non-fermenting Gram negative bacilli (NFGNB) is rare, and whenever it occurrs, inanimate environment is usually implicated as the source. The authors report a case of neonatal meningitis and sepsis with *Chryseobacterium indologenes*, a rare non fermenting Gram negative bacterium with unusual antimicrobial susceptibility. Despite resistance to all the beta lactams, carbapenems and aminoglycosides, therapy with ciprofloxacin led to a favorable outcome.

Keywords *Chryseobacterium indologenes* · Ciprofloxacin · Neonatal meningitis · Sepsis

Introduction

Neonatal infections are the major causes of mortality and morbidity. Causative agents reflect maternal or environmental flora to which baby is exposed and are attributed to inappropriate hygiene during labor and post natal care. The most common pathogens among hospital borne babies include Gram negative enteric bacilli and *Staphylococcus aureus* [1]. Neonatal meningitis by non-fermenting Gram-negative bacilli (NFGNB) is rarely reported. The authors present a case of early onset neonatal meningitis and sepsis by a rare NFGNB *Chryseobacterium indologenes*.

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Case Report

A term, small for gestational age female baby was referred on day 6 of life with lethargy and multi focal clonic seizures. She was born by vaginal delivery weighing 2000 g at another hospital. Upon clinical suspicion of sepsis on day 3, she was treated with intravenous piperacillin-tazobactam and amikacin. On examination, she weighed 1790 g, with heart rate of 160/min, respiratory rate of 58/min and head circumference of 31.5 cm. At admission, hemoglobin was 12.5 g/dL, total leukocyte count 21,600 cells/mm^3 with 48 % neutrophils, 26 % lymphocytes, 10 % monocytes and 16 % bands, and platelet 67,000 cells/mm^3. Renal function tests, arterial blood gas analysis and serum electrolyte levels were within normal limits. Blood and cerebro spinal fluid (CSF)culture in BacT/ALERT (bioMérieux, France) automated system yielded oxidase positive, glucose non-fermenting GNB that was identified as *Chryseobacterium indologenes* by vitek 2 system (bioMérieux, France). It was susceptible only to ciprofloxacin and trimethoprim-sulfamethoxazole but resistant to ampicillin, ampicillin-sulbactam, cefazolin, ceftriaxone, cefepime, aztreonam, meropenem, colistin, amikacin and gentamicin. CSF cytology showed 1800 leucocytes/mm^3 (93 % neutrophils), glucose <10 mg/dL and protein 1008 mg/dL. Gram staining showed pus cells and few GNB. Neurosonogram at admission was normal, however repeat testing after 2 wk showed communicating hydrocephalus. Intravenous ciprofloxacin was initially started at 20 mg/kg/d and subsequently increased to 30 mg/kg/d after

2 wk in view of partial CSF response and developing hydrocephalus. Intravenous medications were continued for total of 4 wk followed by 2 wk of oral ciprofloxacin and cotrimoxazole. The baby showed clinical recovery that subsequently was supported by CSF analysis. After 3 mo follow up the head circumference was 37.2 cm and mild spasticity noted in lower limbs that was improving upon physiotherapy. Auditory brainstem response audiometry was normal. Neurosonogram showed mild dilatation of lateral, third and fourth ventricle.

Discussion

The taxonomically diverse aerobic NFGNB including the isolate reported in the index case are commonly found as environmental saprophytes. *Chryseobacterium* are rare human pathogens comprising of *C. meningosepticum* and *C. indologene*s. *C. meningosepticum* is the most pathogenic member of the genus with high mortality while *C. indologenes* is rarely reported and less understood. Infections are usually nosocomial and frequently associated with invasive devices, immune compromised status and prolonged treatment with broad-spectrum antibiotics. Widespread presence of these bacteria in the environment, especially in the wet surfaces of hospitals and water systems and advances in intensive care has contributed to development of infections by these bacteria [2–4]. Lack of improved test systems in resource constrained settings might lead to under reporting of such infections. Moreover, their unusual susceptibility pattern demands special attention in the management of infections.

In the published literature, a total of 9 cases of *C. indologenes* infections in pediatric age group were found. Blood stream infection was documented in 6 cases; while lumbo peritoneal shunt infection in one and ventilator associated pneumonia in two children were reported [2–9]. The summary of cases is presented in Table 1. To authors' knowledge, this is the first report of early onset neonatal meningitis by *C. indologenes*. The source of infection remains obscure; nonetheless it might be attributed to the inanimate hospital environment in the peripheral hospital. The risk factors such as low birth weight and indwelling devices like intravenous catheterization have presumably contributed to disease development by this bacterium in the neonate.

Despite limited antimicrobial susceptibility data, available reports suggest good activity of newer fluoroquinolones, sulfamethoxazole–trimethoprim and piperacillin–tazobactum while carbapenems and aminoglycosides exhibited poor activity against this pathogen [10]. The neonate survived the severe infection after ciprofloxacin therapy, although developed hydrocephalus as a complication. Though ciprofloxacin

Table 1 Clinical characters, treatment and outcome of previously reported infections by *C. indologenes* in pediatric age group

Age/sex	Type of infection	Predisposing factors	Source of infection	Treatment	Outcome	Reference
1 y/M	Ventilator associated pneumonia	Multiple burns	Unknown	Ciprofloxacin, Cefoxitin, Amikacin	Died	2
5 y/M	Bacteremia	Neuroblastoma, Hickman catheter	Unknown	Unknown	Recovered	3
1 y/F	Bacteremia	Hepatoblastoma, Port-A catheter	Unknown	Unknown	Recovered	3
2 y/M	Bacteremia	Type 1 diabetes mellitus, ketoacidosis, peripheral venous catheter	Unknown	Ceftrioxone	Recovered	4
5 mo/M	Bacteremia	Surgery for atrial septal defect and diaphragmatic hernia, mechanical ventilation	Feeding bottle, multiple water sources at hospital	Vancomycin, Ofloxacin	Died	5
13 y/M	Lumbo peritoneal shunt infection	Congenital hydrocephalus	Unknown	Trimethoprim-Sulphamethoxazole, Rifampin	Recovered	6
33 d/F	Bacteremia	None	Unknown	Cefepime	Recovered	7
Term newborn/M	Ventilator associated pneumonia	Congenital heart disease, hemodynamic instability, mechanical ventilation	Unknown	Piperacillin-Tazobactam	Recovered	8
36 wk newborn	Bacteremia	Preterm, mechanical ventilation	Unknown	Cefoperazone-Sulbactum	Recovered	9

is not an empirical treatment for neonatal infections, its efficacy and high penetration to CNS in otherwise incurable serious illnesses like present case may save life.

Early isolation, identification up to species level, careful interpretation of antimicrobial susceptibility, environmental surveillance to trace the source and implementation of control measures are the mainstay in clinical microbiology laboratory practice. Accurate diagnosis of infection by this rare bacterium is crucial to guide therapy as it is resistant to the common empirical therapy of suspected Gram negative sepsis.

Conclusions

C. indologenes is an uncommon but emerging pathogen causing serious infections in children. Its limited susceptibility to the available antibiotics demands special attention in early diagnosis and revised treatment options for the favorable outcome. Besides, this case reinforces the importance of environmental hygiene and surveillance in high risk neonatal care areas.

Conflict of Interest None.

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